

WHAT IS CLAIMED IS:

1. A lithium ion secondary battery, comprising:

a lithium ion secondary battery body which is provided with an electrolytic solution;
and

5 a safety mechanism which is activated before an inside short-circuit occurs, and discharges decomposition gas of the electrolytic solution, that is generated inside the lithium ion secondary battery body, to an outside of the battery when the battery is overcharged.

10 2. The lithium ion secondary battery according to claim 1, wherein the safety mechanism is activated ten seconds or more before the inside short-circuit occurs.

3. The lithium ion secondary battery according to claim 1 wherein the safety mechanism is a safety valve which opens when a pressure in the lithium ion secondary battery reaches a
15 preset pressure.

4. The lithium ion secondary battery according to claim 3, wherein the preset pressure is set such that the safety valve opens ten seconds or more before the inside short circuit occurs.
20

5. The lithium ion secondary battery according to claim 1, wherein an amount of the electrolytic solution provided into the lithium ion secondary battery is equal to or larger than an amount at which an inflection point, that is related to a generation amount of the decomposition gas per unit time when the lithium ion secondary battery is overcharged,
25 appears.

6. The lithium ion secondary battery according to claim 1, wherein the lithium ion secondary battery is mounted on a vehicle.

30 7. A method for designing a lithium ion secondary battery, wherein the battery is designed such that a safety mechanism of the battery is activated before an inside short-circuit occurs so as to discharge decomposition gas of an electrolytic solution, which is generated inside the battery, to an outside of the battery, based on a first time which is after overcharging is started until discharging the decomposition gas, that is generated inside the

battery, to the outside of the battery is started, and a second time which is after overcharging is started until the inside short-circuit occurs.

5 8. The method according to claim 7, wherein the lithium ion secondary battery is designed such that a difference between the second time and the first time is ten seconds or more.

10 9. The method according to claim 7, wherein the safety mechanism has a safety valve which opens when a pressure in the lithium ion secondary battery reaches a preset pressure, when the safety valve opens, the decomposition gas is discharged outside the lithium ion secondary battery, and the preset pressure is set based on a relationship between the pressure at which the safety valve opens, and the difference between the second time and the first time.

15 10. The method according to claim 9, wherein the preset pressure is set based on charging current of the lithium ion secondary battery.

20 11. The method according to claim 7, wherein an amount of the electrolytic solution to be provided into the lithium ion secondary battery is set based on a relationship between the amount of the electrolytic solution and the difference between the second time and the first time.

25 12. The method according to claim 11, wherein the amount of the electrolytic solution to be provided into the lithium ion secondary battery is set based on the charging current of the lithium ion secondary battery.